Exemption 5-Attorney Work Product/Attorney Client Privileges

SOIL SAMPLING RATIONALE FOR THE EAST ST. LOUIS AND SAUGET AREA IN THE VICINITY OF THE SOLUTIA WG KRUMMRICH RCRA FACILITY AND SAUGET AREA 1 CERCLA SITES

Background: EPA Region 5 recently became aware of a 1975 soil contamination study in the vicinity of the Solutia (formerly Monsanto) facility (Attachment 1). Fifteen surface soil samples were collected from the plant boundary to a distance of 2000 m in four directions. Each sample consisted of five subsamples collected within a radius of 10 m to a depth of 2.5 cm over a 100 cm^2 area. Vegetative matter was removed with forceps and the five subsamples were composited and thoroughly mixed. The sample was then analyzed for PCBs. The gas chromatographic elution patterns most closely matched those of Aroclor 1242, Aroclor 1260, and decachlorobiphenyl. Total PCB concentrations from adding these three compounds ranged from 0.13 ppm to 20.7 ppm. Six of the sample locations had total PCBs >1ppm which is a general cleanup standard for residential areas.

The study states that "The distribution of all PCBs analyzed appears to be higher near the plant site and generally decreasing with distance from the site. There is some evidence that higher concentrations are present in the soils located to the southeast which corresponds with the predominant wind direction in this area."

The attached aerial photo plots the 15 sample locations relative to the Solutia WG Krummrich facility boundary (Attachment 2). The small red triangle within the plant boundary is the location of the Former PCB Manufacturing Area. Also attached is a July 2009 memo presenting EPA's observations on the 1975 soil data (Attachment 3). The sample locations are also adjacent to and/or downwind of disposal areas included in the Sauget Area 1 Sites that contain elevated levels of PCBs (Attachment 4).

Site History: Aroclor (PCB) production at the Solutia WG Krummrich facility began in the 1930's. PCB production ceased in 1977 and the PCB Manufacturing Area was dismantled. A waste incinerator was also operated from 1971 to 1977 in the central portion of the facility (see blue dot in center of Solutia facility, Attachment 2). The incinerator treated 151,000 tons of PCBs, chlorinated solvents, plasticizers, polar solvents, and chlorinated aromatics. Dioxin and furan compounds would be expected to be generated at the former incinerator where combustion of dielectric fluids containing PCBs and trichlorobenzenes took place. Dioxins and furans are combustion products of PCBs and trichlorobenzenes.

The Solutia WG Krummrich facility is surrounded by waste disposal areas that are subject to CERCLA actions. Attachment 4 shows the various locations of CERCLA Sites in Sauget Area 1 and Sauget Area 2. Wastes generated at Solutia were historically disposed at the CERCLA Sites. Other nearby industrial plants are also shown in Attachment 4.

At the Sauget Area 1 CERCLA Sites, PCBs were present in surface sediment in Dead Creek prior to recent removal actions, and in surface soil at Sites G, H, I, L, and N. PCBs were also

found at elevated levels at some Sauget Area 2 disposal areas (i.e., Sites O, Q, R, and S) but they are distant from residential areas and are not considered in the sampling program.

Conceptual Site Model: The 1975 study suggests the distribution of PCBs from the Solutia facility via wind dispersion. PCBs were manufactured at the facility for over 40 years and incinerated for six years. During RCRA corrective action investigations, significant quantities of PCBs were also found in on-site soil at the Former PCB Manufacturing Area, and in the southwest corner where PCBs were apparently transported by rail (see Attachment 2, just east of sample location 9). PCB waste may also have been transported over local roadways and disposed at the CERCLA Sites in Sauget Area 1 and Sauget Area 2.

Potential pathways for PCBs to migrate offsite include air emissions from the manufacturing and incineration process, volatilization, wind dispersal of exposed contaminated soil and sediment, surface runoff, and spills or tracking from trucks.

A wind rose for St. Louis Lambert International Airport shows predominant wind direction (about 50% of the time) to range from the south to the southeast, and from the west to northwest (see Attachment 5). Off-site locations downwind from on-site PCB source areas at the Solutia WG Krummrich facility such as the Former PCB Manufacturing Area, PCB Incinerator, and contaminated soil in the southwest corner, and the Sauget Area 1 Site disposal areas, include:

- industrial facilities; Cahokia Marine, Pchem POTW, Union Electric, Center Ethanol, Big River Zinc, Afton Chemical, Mobil Oil, Sterling Steel, and Cerro Copper.

- commercial businesses between Site P and Big River Zinc.

- the entire residential area of Sauget, IL, and a residential neighborhood of East St. Louis bounded on the east by Falling Springs Road and west by Mississippi Ave (Route 3).

The CERCLA program has evaluated the air pathway as part of its ongoing remedial investigations (RI) for Sauget Area 1 and 2 Sites. A comparison of upwind and downwind air monitoring data showed that air was not a significant pathway at either Site at the time of the study. As part of the RI for Sauget Area 1 Sites, residential areas in Cahokia near Dead Creek were also sampled. Scattered low level contamination was found in some areas but was generally below unacceptable risk levels and did not appear to be related to Dead Creek. These results also suggest that windblown contamination was not a significant pathway in these areas. However, the study was not specifically designed to evaluate windblown contamination and it is a reasonable precaution to conduct additional sampling of downwind residential areas in Sauget and East St. Louis not previously sampled.

Sampling Rationale: Any sampling of surface soil must consider historical sampling, site history, potential migration pathways for PCBs, and potential receptors. The proposed sampling program should be capable of both updating historical data and evaluating exposure to the most sensitive population (i.e., residential). The purpose of this sampling program is to assess whether PCBs and dioxin/furans are a potential concern to human health in the vicinity of the Solutia WG

Krummrich facility and residential areas downwind of the Sauget Area 1 Site disposal areas. If PCB concentrations are found to be present in excess of 1 ppm in residential areas, additional sampling may be required to evaluate potential risks to humans.

Historical samples - Sample locations where significant concentrations of PCBs (>1ppm) were detected are S3, S4, S6, S7, S8, S9, and S13. S4 and S9 are on Solutia property and will addressed under the final remedy currently being implemented. S8 is in the area of cleanup performed at Sauget Area 1 CERCLA sites. S3 and S7 are located in grassy areas near residential properties in Sauget and East. St. Louis. S7 is located in a park. S6 is located in a farm field in a previous industrial area (parking lot?). S13 is located at a gas station. Based on their locations and current land use, *EPA recommends sampling at historical sampling locations S3, S6, S7, and S13. Sampling may not be necessary at S13 if the area is covered with asphalt or concrete. Total of 4 samples.*

East St. Louis - Based on prevailing wind directions and potential PCB sources areas at the Solutia WG Krummrich facility and Sauget Area 1 Site disposal areas, *EPA recommends sampling of a residential area bounded by Mississippi Ave. on the west, Victory Ave. on the north, Falling Springs Rd. on the east, and Morgan St. on the south (see Attachment 2, north yellow highlight). The total area of this neighborhood is 8.5 acres and one sample per ½ acre is recommended. Total of 17 samples.*

Sauget - Based on prevailing wind directions and potential PCB sources areas at the Solutia WG Krummrich facility and Sauget Area 1 Site disposal areas, *EPA recommends sampling of a residential/recreational area bounded by Falling Springs Rd. on the west, Little Ave. on the north, Ogden St. on the east, and Nickell Ave. on the south (see Attachment 2, south yellow highlight). The total area of this neighborhood is 4.5 acres and one sample per ½ acre is recommended. Total of 9 samples.*

Sample Procedures: The 1975 study and sampling performed at the Solutia facility in Anniston, Alabama used composite sampling consisting of five subsamples. *EPA recommends five-point composite samples taken from a defined square foot area with thorough mixing using clean stainless steel equipment. Sample depths at each subsample location should be 0 to 6 inches with removal of any grass and roots.*

PCB analysis performed during corrective action at the Solutia WG Krummrich facility used Method 8082 with speciation of the ten homologs (from monochlorobiphenyl to decachlorobiphenyl) and addition of the homologs to tally total PCBs. The highest total PCB concentration in onsite soil was 22,100 ppm. In addition dioxin/furans were analyzed using low resolution Method 8280A and reported as TEQs. The highest dioxin concentration in onsite soil was 67.28 ppb on contaminated industrial property. However, for residential areas, using high resolution Method 8290 can report dioxin/furans in the ppt range. *For data comparability, EPA recommends analysis of surface soil samples for PCB homologs using Method 8082. Dioxin/furan analysis is also recommended given the onsite incineration of PCBs. For dioxin/furans, EPA recommends high resolution Method 8290 to ensure the reporting limits are low enough to assess detections on residential property.*

Conclusion: *EPA recommends 30 composite soil samples from 0 to 6" be analyzed for PCB homologs and dioxin/furans at two residential areas in East St. Louis and Sauget, and at four historical sample locations. Specific sample locations in the residential areas should be determined by evaluating historical aerial photos (disturbed areas should be avoided), and the ability to obtain signed access agreements. Sampling should be preferably performed in each ½ acre grid of each residential area.*

BY: Ken Bardo, CAS 2
08/20/09

Attachment 1

EPA - 560/7-76-001

REVIEW OF PCB LEVELS IN THE ENVIRONMENT

JANUARY 1976

OFFICE OF TOXIC SUBSTANCES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

2.5 Data from Localized Monitoring Efforts Industrial Plants, Products, Sewage Treatment Facilities and Landfills

2.5.1 Industrial Plants

2.5.1.1 Monsanto Co., Sauget, Illinois

The only PCB production facility in the United States is the Monsanto plant at Sauget, Illinois which has produced PCB mixtures ranging from 20 to 68 percent chlorine. Polychlorinated terphenyls have been produced at this facility, but production was suspended in 1971.

Soil contamination studies[7] were initiated in February 1976. The sampling locations around the Monsanto facility are identified in Figure 2.5-1. The levels of Aroclor 1242, Aroclor 1260 and decachlorobiphenyl found at these sampling sites are listed in Table 2.5-1. The distribution of all PCBs analyzed appears to be higher near the plant site and generally decreasing with distance from the site. There is some evidence that higher concentrations are present in the soils located to the southeast which corresponds with the predominant wind direction in this area.

A typical chromatogram of a soil sample obtained near the plant is shown in Figure 2.5-2 along with the reference chromatograms of Aroclor 1242 and 1260 run under the same instrument conditions. Using these reference spectra, this sample contains 11 ppm Aroclor 1242, 9.3 ppm Aroclor 1260 and 1.0 ppm decachlorobiphenyl.

All PCB measurements were made using a Varian Model 2760 electron capture gas chromatograph with a 1.8m glass column operated at 200°C. The column had a 3mm Id and was packed with 1.5/1.95% OV-17/WF-1 on chrom W-HP, 80/100 mesh support. The flow rate was 68 ml/min with an inlet pressure of N_2 at 38psig.

Table 2.5-1
PCB Levels in Soils, ppm, Monsanto

Sample Station	Aroclor 1260	Aroclor 1242	Decachlorobiphenyl	Total PCB
1	0.05	<0.01	0.097	0.147
2	0.12	<0.01	0.61	0.73
3	1.4	<0.01	0.90	2.3
4	0.31	0.68	0.38	1.37
5	0.20	<0.01	0.27	0.47
6	1.3	0.82	1.6	3.72
7	2.9	3.0	1.3	7.2
8	9.6	6.1	2.4	18.1
9	0.65	<0.01	0.12	7.7
10	0.28	0.45	0.081	0.811
11	0.10	<0.01	0.049	0.145
12	0.26	<0.01	0.081	0.341
13	9.6	10.0	1.1	20.7
14	0.03	<0.01	0.40	0.43
15	0.39	0.46	0.12	0.97

SOURCE: Unpublished Report, Contract 68-01-2978, USEPA, Office of Toxic Substances; July 1975

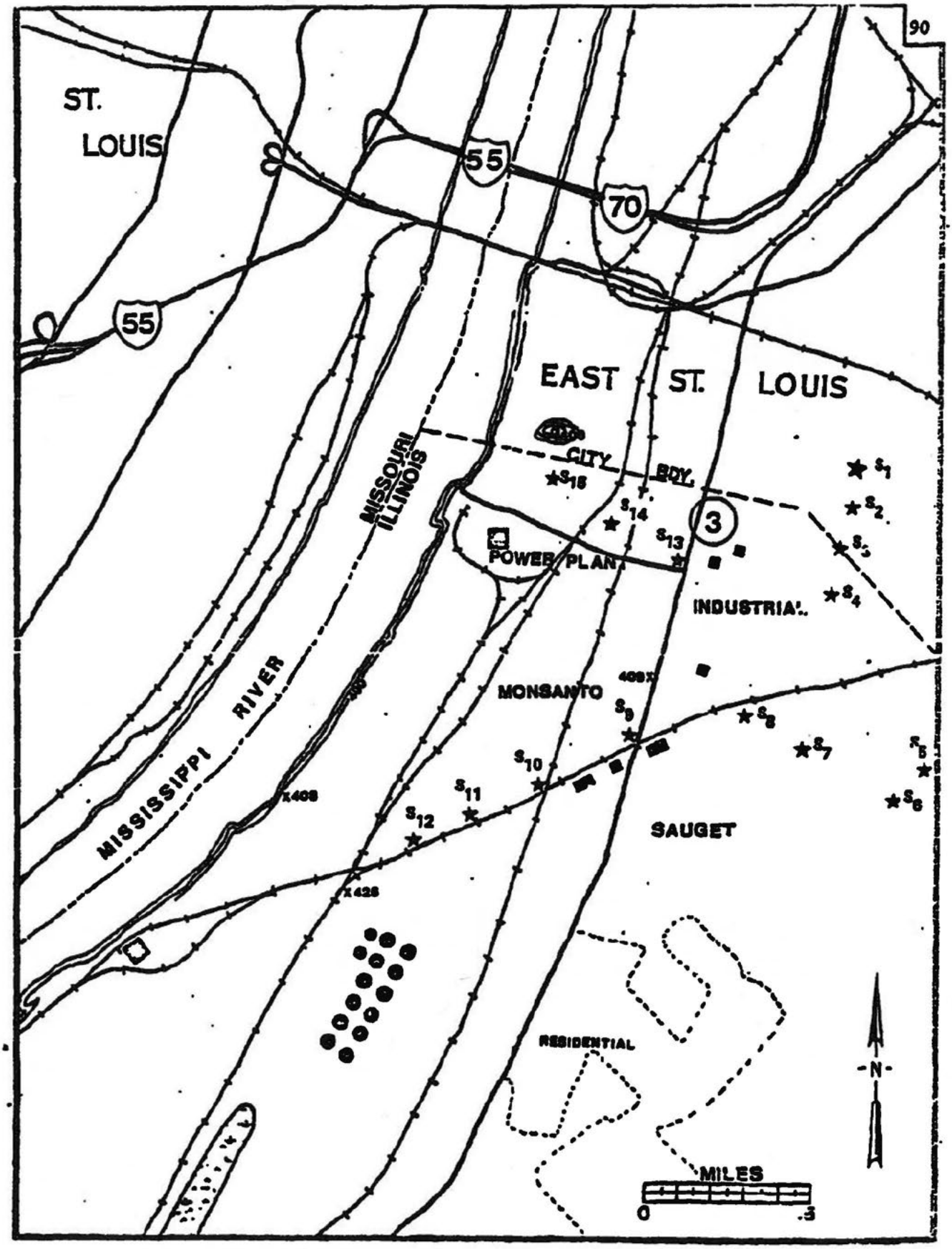


FIGURE 2.5-1 SAMPLING LOCATIONS, MONSANTO

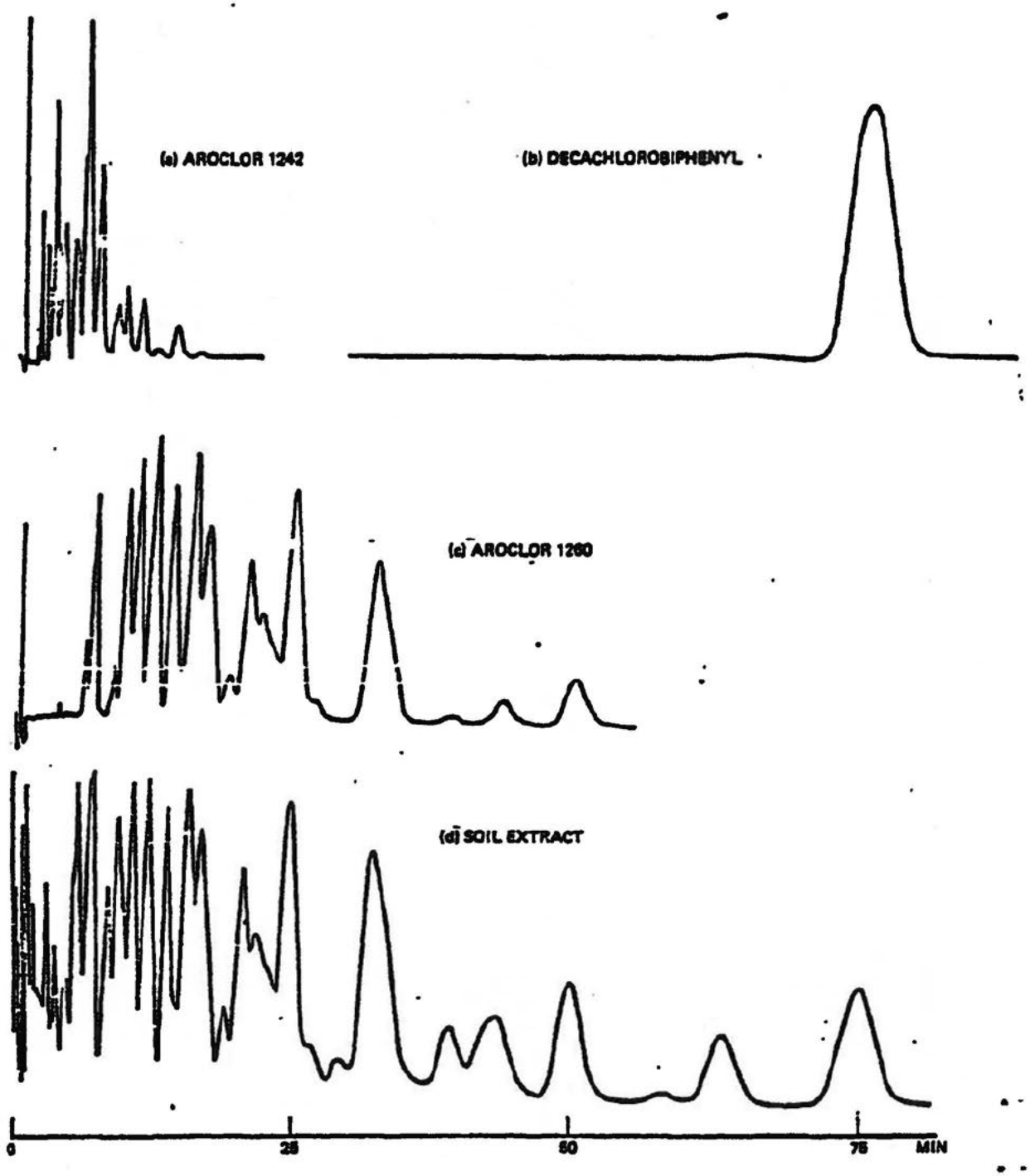
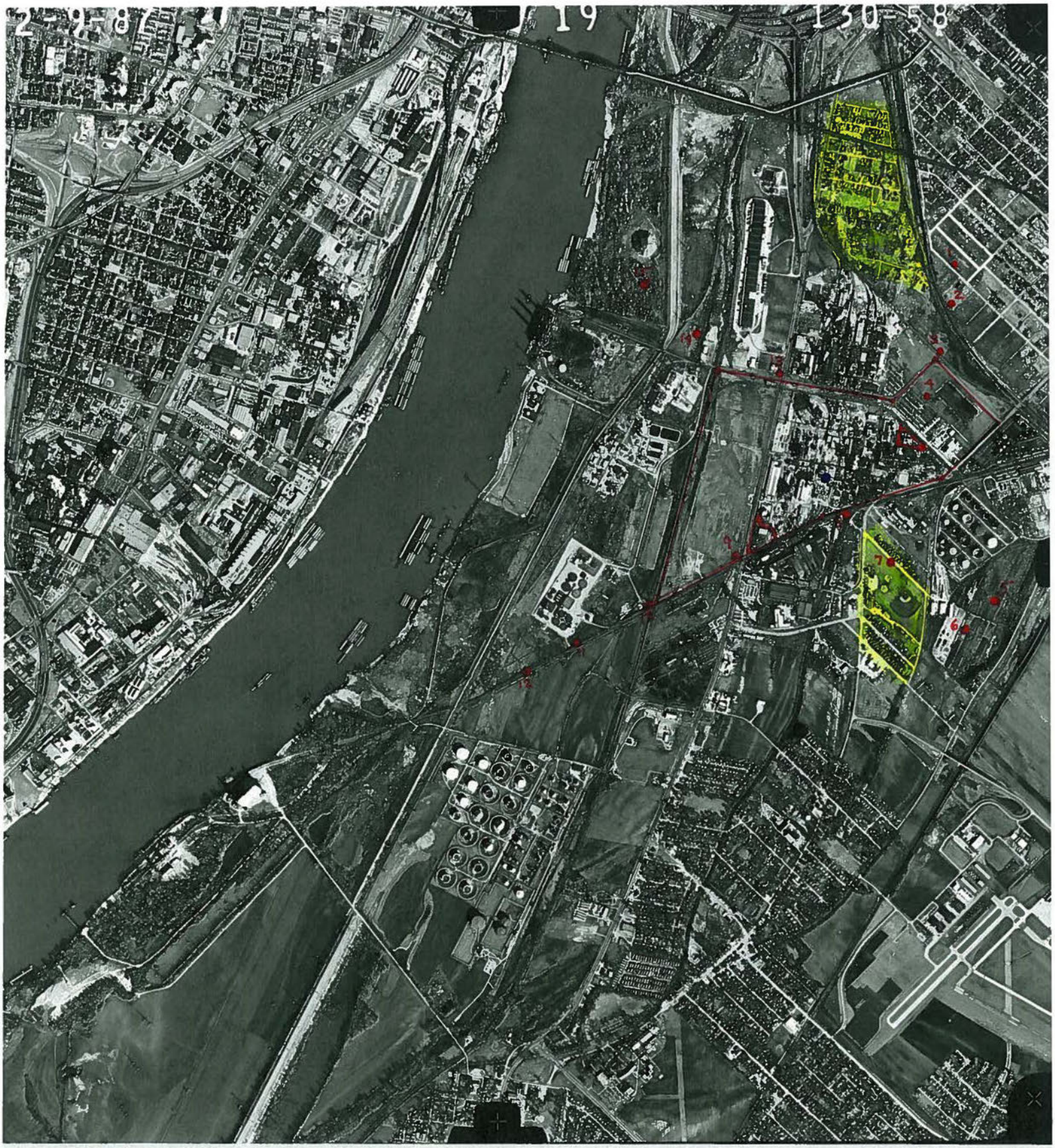


FIGURE 2.5-2 TYPICAL CHROMATOGRAMS OF STANDARD AROCLORS, DECACHLOROBIPHENYL AND A SOIL SAMPLE TAKEN IN THE VICINITY OF MONSANTO CO., SAUGET, ILLINOIS



Attachment 2

Attachment 3

Observations on PCB Monitoring Effort Report at Solutia Located in Sauget, Illinois

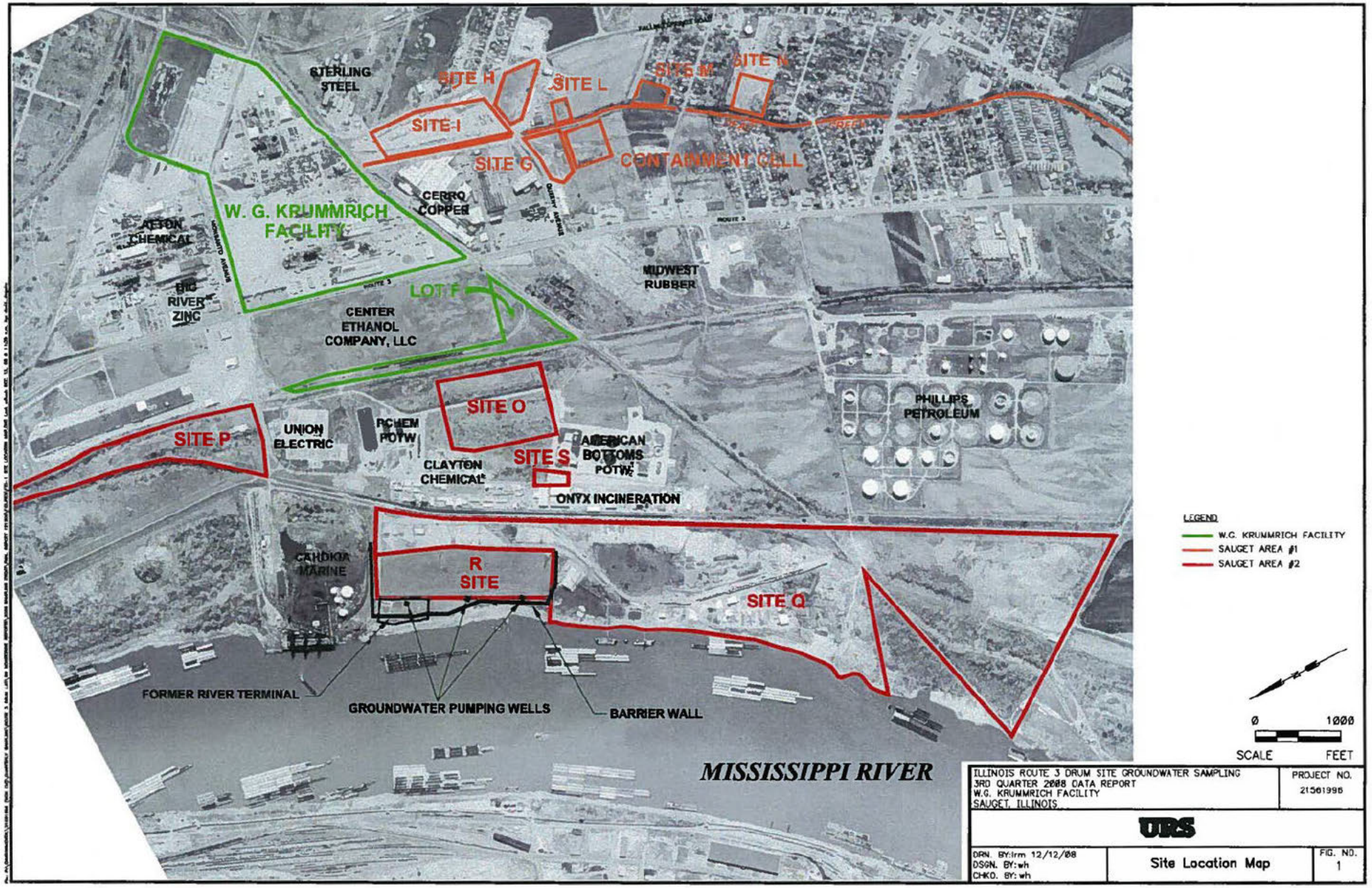
1) **S1, S2, S3, and S4:** These soil sample locations are on a north-south transect from the Former PCB Manufacturing Area. Sample locations S1 and S2 are in a former residential area off Wilford Ave. in East St. Louis and have total PCB concentrations less than 1 ppm. Sample location S3 appears to be in a wet grassy area with PCBs slightly greater than 1 ppm. Sample location S4 is on Solutia property and is slightly greater than 1 ppm. The area just to the south of S4 at the Former PCB Manufacturing Area is being remediated by Solutia under the RCRA Consent Order.

2) **S5, S6, S7, and S8:** These soil sample locations are on a southeast-northwest transect from the southern end of the Former Chlorobenzene Process Area. Sample location S8 has a PCB concentration of 18 ppm and is located at the former Dead Creek drainage area which is part of the CERCLA Sauget Area #1 Sites. Sample location S7 is at a former residential area along Little Ave. in Sauget that was razed in approximately 1990 (based on historical aerial photos) and has 7 ppm PCBs. The area now appears to be a park with a baseball field. Sample locations 5 and 6 are located in a current farm field that appears to have been used in the past for industrial purposes since at least 1937. At the time of sampling, it looked partially disturbed. PCB concentrations are less than 1 ppm at S5 and 3.7 ppm at S6.

3) **S9, S10, S11, and S12:** These soil samples are in a northeast-southwest transect along a railroad on property owned by Solutia and part of the RCRA facility (Lot G). All PCB concentrations are less than 1 ppm except at S9 which is 7.7 ppm. S9 is located in Solutia Lot F but this portion of Lot F was sold and developed by Center Ethanol. However, this small area may still be undisturbed. Across Route 3 to the east, PCBs are also present along the railroad right-of-way and this area is being remediated by Solutia under the Consent Order.

4) **S13, S14, and S15:** These soil samples are in a southeast-northwest transect from the intersection of Route 3 and Monsanto Ave. Sample locations S14 and S15 have PCB concentrations less than 1 ppm. S13 at the northwest corner of the intersection had the highest PCB concentration in the study of 20.7 ppm. This area appears to have been undeveloped until commercially developed in approximately 1980. The area today is likely paved.

Attachment 4



ILLINOIS ROUTE 3 DRUM SITE GROUNDWATER SAMPLING 3RD QUARTER 2008 DATA REPORT W.G. KRUMMRICH FACILITY SAUGET, ILLINOIS	PROJECT NO. 21561996
URS	
DRN. BY: lrm 12/12/08 DSGN. BY: wh CHKD. BY: wh	Site Location Map — FIG. NO. 1

Attachment 5

Illinois State Climatologist Office

Jim Angel, state climatologist

Illinois State Water Survey
Institute of Natural Resource Sustainability
University of Illinois at Urbana-Champaign

Wind Roses and Wind Frequency Tables for Illinois

Jim Angel, state climatologist

These data are compiled from the few sites that have long-term wind statistics. The averaging period is 1961 to 1990.

Note: wind direction is reported as the direction **from** which the winds are blowing. For example, a "south wind" means the wind is blowing from the south to the north.

Other Resources

Wind Energy Potential
Wind Data (WARM Network)

Chicago, IL

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Plot:													
Frequency:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual

Rockford, IL

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Plot:													
Frequency:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual

Springfield, IL

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Plot:													
Frequency:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual

Peoria, IL

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Plot:													
Frequency:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual

Moline, IL

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Plot:													
Frequency:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual

Evansville, IN for Southeastern IL

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Plot:													
Frequency:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual

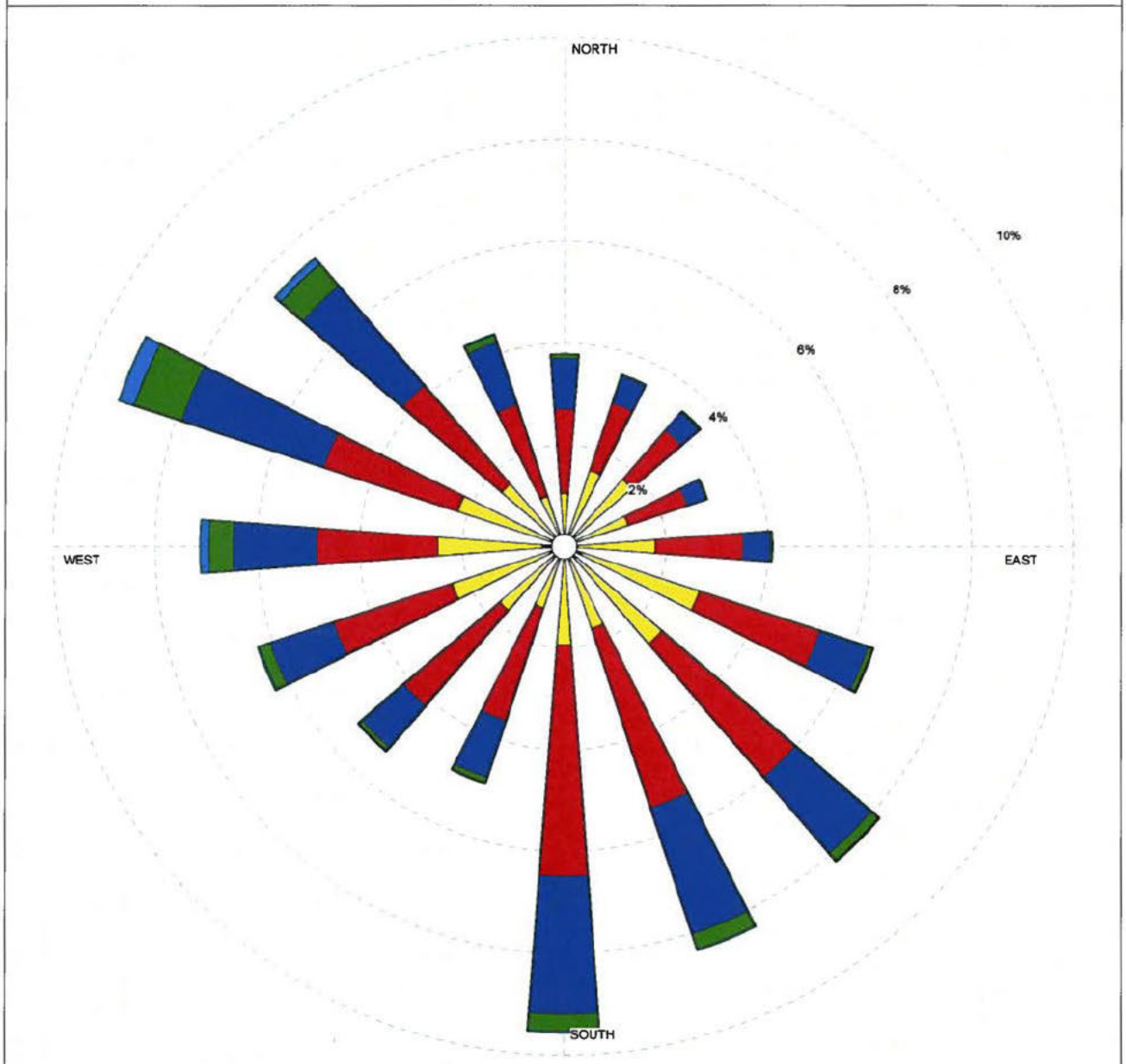
St. Louis, MO for Southwestern IL

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Plot:													
Frequency:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual

Attachment 5

WIND ROSE PLOT

Station #13994 - ST LOUIS/LAMBERT INT'L ARPT, MO



Wind Speed (Knots)

- > 21
- 17 - 21
- 11 - 16
- 7 - 10
- 4 - 6
- 1 - 3

MODELER	DATE	COMPANY NAME
	10/7/2004	**Illinois State Climatologist Office**
DISPLAY: **Wind Speed**	UNIT: **Knots**	COMMENTS: **1961-1990 Annual Average**
AVG. WIND SPEED: **9.02 Knots**	CALM WINDS: **4.79%**	
ORIENTATION: **Direction (blowing from)**	PLOT YEAR-DATE-TIME: **Jan 1 - Dec 31 Midnight - 11 PM**	PROJECT/PLOT NO.